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Economic Regulation in the Network Industries: where does it stand?

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Abstract

The purpose of this paper is to present the different forms of economic regulation in the network industries, following the debate about restructuring these industries. The main theories on (economic) regulation of the network industries are presented and the most important regulatory instruments available to regulators are identified. Several regulatory theories were developed over the past decades proposing different types of public intervention in the market, and up to a certain extent influencing the nature of the reform process. Depending on the region, this process is characterised by the privatisation and/or the liberalisation of network industries. Even in situations where it is difficult to introduce competition, some theories explore alternative mechanisms to overcome this limitation, which consequently influences regulation. In practice, deregulation in the network industries pertains essentially to command-and-control types of regulation, and not all the types of intervention in the market. In reality, instead of complete deregulation, there has been a move towards different types of intervention (a process also known as re-regulation), with a special emphasis on incentive regulation.

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1. INTRODUCTION

Over the past decades, most network industries have evolved from integrated monopolies to restructured industries with private sector participation, and/or to (partially or almost completely) liberalised industries. The literature on regulation in the network industries has followed, and sometimes triggered, the restructuring processes in sectors that are normally characterised by large sunk costs and strong social, environmental, and economic externalities (e.g., Klein, 1996). These industries include telecommunications, postal services, energy (electricity and gas), railways and public local transport, air transport, water distribution and sanitation.

The reform processes and the evolution of the theories about regulation do not necessarily follow a specific order of events, and differ across network industries and regions. In fact, some sectors were and are being liberalised without having been privatised first (e.g., air transport in several European countries); while others were privatised but not liberalised (e.g., water utilities in England and Wales in 1989). In geographical terms, the tradition in the United States of America (USA) is more liberal than in Europe. In the USA there has been a strong belief in the market and on *ex-post* intervention, while in Europe public ownership was expected to protect the general interest against private interests, and interventions were mainly done *ex-ante.* Many developing countries present a different path, mainly due to the influence of World Bank policies. The Bank started by pro(im)posing privatisation, however lately it is focusing on competition as the restructuring solution for these industries.

Regulation of network industries can be classified into three main categories: economic, social and technical regulation. *Economic regulation* refers to introducing competitive market structures in industries characterised by market failures, and to market regulation. Market regulation concerns specific aspects of operating in the market, such as defining tariffs and fostering operational efficiency. The major instruments of economic regulation pertain to price and access regulation. Chapters 2 and 3 analyse in detail the justifications for economic regulation and its major instruments.

Social regulation refers to regulatory policies and practices designed to achieve social policy objectives that may not be met through competitive market forces or economic regulation alone. They pertain at correcting other market failures, such as externalities and information asymmetries (Ogus, 2004). Service quality and public service obligations become major issues with regulated network industries providers.

Quality standards are a dominant form of social regulation. Quality standards subject suppliers to behavioural controls and impose penalties to those who fail compliance. They are particularly important when there are price controls because the latter create incentives to reduce quality. Regulatory standards have associated costs born by the authority and the firms. These are administrative costs pertaining to standard formulation, monitoring and enforcement; as well as compliance costs related to capital and other costs incurred to meeting the standards.

The goods and services provided by the network industries are considered as being of general interest to society (because they are essential for achieving acceptable levels of quality of life and for the development of countries and regions). For this reason, providers of the service are subject to specific public service obligations, i.e. to specific requirements aiming at ensuring that certain public interest

objectives are met. European institutions have developed the concept of universal service in the context of the liberalisation of some network industries (telecommunications, post and electricity). Universal service obligations (USO) refer to a minimum set of services of specified quality, to which all users throughout the Community have access at an affordable price (Garcia et al., 2007). USO became important instruments of social regulation in the newly liberalised network industries. By setting a USO, political authorities ensure a non-discriminatory provision of services of general interest, overcoming social exclusion and isolation. The definition of USO varies across industries and countries. The definition is not always clear, and it often gives rise to different interpretations. With the end of monopolies, the funding of the USO became a major issue. Usually, the burden of USO provision lies on the incumbent.

Finally, externalities and informational asymmetries may also create technical problems related to interoperability and interconnection when the infrastructure is unbundled. In this event, there is the need to ensuring the integrity of the infrastructure systems through technical regulatory instrument. In the situations of structural unbundling, the old vertically integrated utility model is abandoned and there is the need to ensure that the physical material of the system does not fail when exposed to external and internal stresses. Integrity of the system is essential for the overall quality of the service provided. It requires a regular assessment of the state of the overall infrastructure and frequent decisions about maintenance, replacement and renewal of unreliable elements of the network.

This paper focuses on **economic regulation** of network industries. The following chapters present and analyse several theories developed over the past decades, proposing different answers to the question "why network industries need to be regulated even after being restructured?" In several cases, these theories have influenced the nature of the network industries' reform processes. The first group of theories presented here has emerged in the context of privatisation (chapter 2). The second group of theories relates to the liberalisation paradigm by defending the virtues of competition and the power of its alternative forms (chapter 3). Finally, chapter 4 focuses on how the forms of economic regulation of the network industries tend to converge at incentive regulation.

2. PRIVATISION AND THE NEED TO REGULATE

Traditionally, the default resolution of the conflict between consumer protection and investment needs used to be public ownership, thus providing both access to investment funds and political control over final prices (Newbery, 2004). This is still the case in many countries and industries in the world.

However, in the early stages of the process of restructuring the network industries, there was a shift from public to private ownership. There were several reasons on the grounds of the decision to privatise. One of the most important was the increase in operational efficiencies expected by means of a change in ownership. Neo-classical authors presented other reasons to privatise, such as reducing the public sector borrowing requirement, and reducing government involvement in enterprise decision making (Vickers and Yarrow, 1988).

Together with the trend towards the privatisation of public utilities came the need for government regulation. State ownership was substituted by economic regulation, i.e. by government intervention in the market. At this stage the need for regulation was basically related to the need to ensure that the monopolist would not abuse of its privileged position in the market. Chapter 2.1 presents the main

theories about regulation that emerged in the context of privatisation of network utilities. Chapter 2.2 follows next by presenting pricing as the key regulatory instrument at the authorities' disposal.

2.1 Main theories about regulation

There is a long tradition of regulating private utilities in the United States of America (USA), where several theories were initially developed in order to explain the reasons for regulation, and how regulatory agencies behave when they are created. The most important ones are Public Interest and Private Interest Theories.

2.1.1 Public Interest Theory

The Public Interest Theory of regulation suggests that government regulation is justified by the pursuit of the public interest. It thus suggests that regulation arises from the need to protect and maximize social welfare. Public Interest Theory assumes that rational and disinterested expert regulators exist, and that they actually are the best means to identify and ensure the common goals of society. The theory is based on two main assumptions: (1) markets are prone to fail if left alone; and (2) the transaction cost of government regulation is zero. Thus, market imperfection justifies regulation, which has no cost (Posner, 1971). The objective of regulation is to achieve certain public desired results by rectifying situations of market failure, which make markets operate inefficiently or inequitably. The most relevant market failures in network industries arise in relation to natural monopolies, externalities (e.g. public good characteristics and pollution), and asymmetry of information in the market.

Several critics are made to this theory[1]. Some authors argue that public interest is hard to define and to be written down into specific policies. There are no complete informed and rational decisions, so critics to the theory say that it is preferable to rely on the market to solve market imperfections than on government intervention. Moreover, in many cases, empirical research could not demonstrate a positive correlation between regulation and market failures. A second critic pertains to the lack of clarity on how to get the equilibrium between economic and social efficiencies because these are frequently incompatible. Another drawback is related to the fact that Public Interest Theory assumes that government intervention is perfect and has no costs, which is not the case in reality (Posner, 1974). Additionally, regulators are thought to have a disinterested expertise and to be efficient, which may not be always the case. Some critics of this approach also argue that regulation is extensively influenced by economic and political powers. Thus, it is claimed that regulatory policies and institutions are often influenced by powerful regulated parties, politicians or groups of consumers (Baldwin and Cave, 1999). Finally, Public Interest Theory is said to be incomplete since it does not specify where and how regulation should be introduced.

Not all the authors were convinced by the way Public Interest Theory justifies regulation. Therefore, Private Interest Theories emerged as alternative theories to explain government intervention.

[1] Some of these are general critiques addressed to regulation in general.

2.1.2 Private Interest Theories

Private Interest Theories or, as some authors designate them, Capture Theories, are driven by the pursuit of private and not public interests. They emerged as a response to the perception that regulatory agencies were ineffective in meeting the public interest goals.

Stigler (1971) proposes that the creation and operation of regulatory agencies is meant to transfer economic resources to private interests in return for votes or campaign contributions to politicians – i.e., he provides a political justification for regulation. Stigler, based on Olson's theory of collective action, also explains that "as a rule, regulation is acquired by the industry and is designed and operated primarily for its benefits". In this context, regulation is not imposed to the economic agents but it is demanded and supplied according to the interests of those regulated. So, regulation is the outcome of the demand and supply forces, i.e. it is a product supplied to the interest groups that value it the most. As such, the value of regulation to particular groups and the costs of obtaining regulation become important variables in the regulatory arena.

Private Interest Theory thus considers that regulatory agencies come to be dominated over time by the industries regulated, even if at first they were driven by the pursuit of the public interest. The regulator acts in the interests of incumbents rather than in the interest of society as a whole. At the heart of this argument is the fact that firms have stronger incentives and resources to defend their cases than consumers do. The industry's control of information, its career opportunities, and the repeated iterations between the regulator and the firm, often lead to a situation where the regulator comes to serve the interests of the regulated.

Empirical findings, mainly from the USA, on regulatory decisions that were against firms' interests questioned these arguments. Private Interest Theory then developed to include other actors, such as consumers, and not only the relationship between the regulator and the firm (Posner, 1971). This is the approach taken by the Economic Theory of Regulation.

Economic Theory of Regulation

The Economic Theory of Regulation takes a broader view than initial Capture Theories by admitting the possibility of capture by interest groups other than the regulated firm (Peltzman, 1976). This theory recognises that the need to regulate is likely to appear in the event of market failures because these failures inflict losses on some interest groups. Stigler and Peltzman suggest that in the case of a failure of competition, or monopoly, there is monopoly profit that the legislator would give the regulator the power to dispose of. Therefore, the regulated industry in general has an incentive to influence the regulator so that it benefits from a "regulatory rent" (i.e., a market for regulation is created). In this case, the regulator would be captured by the industry because the commodity of regulation goes to those who value it most. Producers would thus tend to be better served by regulation than the (more diffused, less organised) masses of consumers (Baldwin and Cave, 1999). The proponents of this theory advocate that there is a tendency to design regulation in benefit of groups that are relatively small but who have strong preferences, homogeneity of interest and relatively low organisational costs. Nevertheless, the price will be less than the monopolistic price given that pro-producer tendencies are somehow disciplined by consumer groups.

The main assumptions of this theory are that (1) all parties involved in regulation are income maximisers (politicians, for instance, seeking votes to maximise their cash incomes), well informed, and learn from experience; and (2) regulation is costless (Baldwin and Cave, 1999).

Private Interest Theories, including the Economic Theory of Regulation, emerged on the basis of public choice analysis (Black, 1996). Public Choice Theory aims at explaining how individual preferences are reflected in voting and other procedures adopted by institutions, and at evaluating their consequences for social welfare (Ogus, 2004). The proponents of the theory argue that civil servants do not have incentive to manage state investments in an altruistic way, consistent with the public interest. This theory defends that civil servants' primary motivation is their own interest, and it accuses special interest groups of lobbying in such a way that the state outputs are deformed in favour of particular groups in society. In the majority of the cases, these groups are well organised and politically powerful. In this situation, there is clearly the risk that regulation goes beyond the economically efficient level.

These theories are in line with the thought of the so-called Chicago school. Sometimes the economic theory of regulation is even called Chicago Theory.

Special Interest Theory

Special Interest Theory challenges the emphasis placed on the regulatory agency's control by one narrow group of powerful interests. This theory proposes that multiple groups compete for the control of the agency's activities (Becker, 1983, Peltzman, 1976). Stigler and Peltzman argue that the behaviour of legislators is driven by the desire to remain in office, and that the different interest groups compete against each other (by offering political support in return for favourable legislation). Peltzman (1976) tries to combine both views by considering the regulator an actor searching for support from competing interest groups.

Recent authors (e.g., Armstrong et al., 1994) tend to support this view that regulators draw support from a variety of sources that change over time. They focus on who the winners and losers are in the regulatory process, the associated rent seeking, and the incentives regulators face to act for or against various groups in society. The regulator must trade-off the desires of consumers against those of the firm. When there is a risk of capture, it may be desirable to limit the discretion of the regulator in order to reduce the incentive for the firm to expand wasteful resources and rent seeking. To overcome this problem, Armstrong et al. (1994) propose that regulators should be banned from integrating the regulated firms' staff after their retirement from public service. This would prevent the temptation of benefiting the industry today in order to be rewarded by a generous remuneration in the future.

The following chapter presents the main instrument of economic regulation, i.e. pricing of the service.

2.2 Pricing of the service as the key regulatory instrument

The control of prices is the most common form of economic regulation. In markets with monopolistic characteristics, the intervention on prices aims at preventing predatory pricing and over charging. *Marginal cost pricing* provides the first best solution to pricing. However, it raises a problem by not taking into account other overheads, such as depreciation and capital costs (Kahn, 1970). In network industries, facilities have normally spare capacity in the short-term, so the cost of providing an

additional unit of the service is low. Actually, only a part of the firm's costs is variable in the short-run, which means that by setting prices at the short-run marginal cost level, fixed costs would never be covered. It therefore raises the issue of average cost pricing (based on cost recovery premises) versus marginal cost pricing (based on allocative efficiency premises).

The main challenge when setting prices for network industries pertains to their natural monopoly characteristics, namely to find an alternative to the marginal cost principle that avoids the "dead-weight" welfare loss associated with monopolistic pricing (Ogus, 2004). Possible solutions that avoid the "dead-weight" welfare loss are (1) to allow for price discrimination; (2) to set a two part tariff composed by a fixed fee and a per unit charge equal to the marginal cost; and (3) to meet the operator's loss from marginal pricing with a subsidy. The latter is called *Ramsey pricing* if the amount exceeding marginal cost is inversely proportional to elasticity of demand (i.e., if it is charged to customers with less elastic demand functions). All these solutions have drawbacks when implemented in network industries. For example, the universal service obligation defined in many network industries may not allow for price discrimination. Also, the fixed fee of the two part tariff might discourage low-income consumers from taking the service. Finally, subsidies may distort incentives for efficiency.

In the remaining of this chapter we present the main types of pricing controls used in network industries. They fall into two main categories: control of the rate level, and control of the rate structure.

Rate levels

Rate of return regulation

This method establishes a price that covers the firm's expenditures (including operating cost and depreciation) plus a reasonable profit on capital investment (i.e., a "fair" rate of return, ROR). It aims at increasing certainty relatively to the profit outcome. The main difficulty of this approach pertains to the definition of a "fair" rate of return capable of attracting the adequate level of investment. There are different methods for calculating the ROR based on returns in comparable industries, on the necessary return to attract investors in the past, and on returns obtained from a portfolio of diversified investments. However, none of these methods guarantees the definition of the ROR that optimises investments in a specific industry at a particular point in time (Ogus, 2004).

The main critics to rate of return regulation pertain to its lack of incentives. In effect, the fact that the firm passes on all its costs to consumers restrains incentives to improve efficiency. Moreover, since the profit is set according to the asset base, the firm might be tempted to over-invest (i.e., gold plating) and intensify its costs (i.e., cost padding) (Averch and Johnson, 1962). Finally, there are large regulatory (administrative and information) costs related to monitoring capital and operating costs, and to defining the necessary investment needs (and, accordingly, the fair rate of return).

Price-cap regulation (RPI-x)

Under price-cap systems, popularised by Littlechild (1983), the price is fixed and, therefore, the profit margin is variable as a function of the costs. The firm has to ensure that a weighted average of price increases in one year does not exceed the percentage increase in the Retail Price Index less a variable

factor x (Armstrong et al., 1994). The factor x, which is the core of the system, is calculated by the regulatory agency and pertains to the firm's cost-efficiency potential. In its origins, price-cap regulation was intended to be a transitional form of regulation until competition developed.

The advantage of price cap over rate of return regulation is that it has stronger incentive properties. Price-cap should translate into an incentive for the firm to become more efficient because lower costs of production lead to higher profits. Prices are most commonly fixed on the basis of the costs observed for firms operating under the same conditions (i.e., yardstick competition).

Apart from cumbersome information requirements, the main criticisms to price-cap regulation pertain to the real impact of its incentive properties. Some authors criticise the length of time between reviews, most commonly five-years, as being very short in comparison with the lives of many assets, yet too long to predict costs with confidence. Price caps thus provide weak incentives for efficiency savings (e.g., Mayer, 2001). Laffont and Tirole (1993) go a bit further by pointing out that efficiency incentives depend not only on the length of time between reviews but also on the percentage of the firm's costs that are covered by the price cap. Another critique focuses on capacity investment, a critical issue in network industries. Newbery (2002) argues that setting price caps may be a good solution for transferring past efficiency gains to consumers, yet it is not proved that they provide incentives for efficient and adequate capacity investment. These critiques led to the definition of alternative price-cap mechanisms, such as the sliding scale and relative price regulation methods presented below.

Sliding scale regulation

Sliding scale regulation (Burns et al., 1995) is a mixture of price cap and rate of return mechanisms. The adjustment in prices depends on whether the agreed profit level is attained. When the agreed profit level is reached, prices are adjusted downwards (independently of time). The obvious disadvantage of this system is that it does not create incentives for cost efficiency. The advantage is that the eventual benefits of efficiency gains are shared between producers and consumers in the short run.

Relative Price Regulation (RPR)

The criticisms to RPI-x regarding its incentive properties led Mayer (2001) to propose a new type of regulatory system, which combines the best features of rate of return regulation (setting the prices based on actual rather than on projected outcomes) with the incentives of price cap. Mayer argues that providing incentives through price cap is a noble objective, yet the way it is being implemented across network industries is not sustainable. The main reason is that price-caps focus on creating aggregate incentives over time (which are dependent on forecasts of future costs and demand) instead of creating relative incentives across firms (Mayer, 2001). High level of projections' uncertainty calls for systematic regulatory interventions between reviews, consequently undermining price-cap incentives.

RPR involves adjusting the regulatory asset base of all companies for (1) projected new capital expenditures; (2) changes in the RPI; and (3) differences between average industry rates of return and the cost of capital. Companies retain incentives to outperform their peers by retaining relative returns in excess of the cost of capital. RPR intensifies incentives by allowing excess returns to be retained by the regulated firm for longer periods and by mitigating the risks of regulatory intervention. One of the

main limitations of this approach is that it cannot be applied to natural monopolies where by definition there is only one firm.

Rate structure

There are four common types of rate structures in network industries: linear pricing, nonlinear pricing (block tariffs), two-part tariffs, and peak load-pricing.

Linear pricings

Under linear pricing, the price per unit remains the same irrespective of the volume of consumption. This uniform rate may be based on the average or on the marginal cost of service provision. It is easy to understand and implement, and it provides a stable revenue stream for the operator.

Nonlinear pricing

There are two different types of nonlinear tariffs, namely decreasing and increasing block tariffs. Under decreasing block tariffs, the price per unit of service decreases with the volume of consumption. It is justified under natural monopoly conditions. Its main disadvantage refers to its low incentives for resource conservation. As for increasing block tariffs, the unit price increases with the volume of consumption. It can be implemented for equity purposes or to face resource or capacity constraints.

Two-part tariffs

A two-part tariff is a price discrimination technique in which the price of the service is composed of two parts, namely a lump-sum fee and a per-unit charge (that may correspond to an increasing or a decreasing block tariff).

Peak-load pricing

Finally, the rate structure may support tariff differentials for peak demand. That means that prices are higher when the demand for the service is at its highest levels (Boiteaux, 1949), as a means of reflecting investment costs needed for meeting peak demand. According to economic theory, if the same type of capacity serves all users, then capacity costs should be levied only at peak hours.

When the network industries are privatised, state ownership is normally substituted by some form of economic regulation in order to avoid the abuse of the monopolist privileged position. In this chapter, two main bodies of literature proposed alternative approaches to regulation. The first one presented regulation as resulting from the need to correct market failures and to pursuit the public interest. The second approach argued that regulation results from the pressure made by interest groups. Independently of the reasons behind government intervention in the market, pricing of the service is the most important form of economic regulation in the network industries. Different types of pricing the service were presented and their relevance when implemented in the network industries was assessed in this chapter. The following chapter focuses on the challenges posed by a different type of reform of the sectors, i.e. liberalisation, and on the different forms of intervention adapted to the new context.

3. THE CHALLENGES POSED BY LIBERALISATION

Gradually, contradictory findings on the relation between ownership and efficiency questioned the purpose of privatisation. Some authors argue that the restructuring of the network industries should not result from a change of ownership – i.e., from privatization –, but rather from the introduction of competition, i.e., from liberalisation (e.g., Armstrong, 2003, Newbery, 2002, Vickers and Yarrow, 1991). To recall, liberalisation refers to a process by which competition is introduced in situations or sectors so far characterised by monopolies. Its economic rationale is grounded on the recognition that, in principle, competition is more prone to achieve efficiency than monopoly[2]. In most of the markets, competition ensures that the interest of the consumers is satisfied because it obliges the firms to be cost efficient, to attain a certain level of quality or to be innovative. This is the only way firms can survive and be profitable in the competitive market (Armstrong et al., 1994).

The process of liberalisation can also be characterised as a process of "deregulation". The idea behind is that, where there is competition, normal competition policy should replace regulatory control exercised by the regulatory entities. However, in practice, many "deregulating" measures in the network industries involved a change in intensity rather than in number (Ogus, 2004). This means that regulatory forms are less interventionist (e.g., less prescriptive standards; general targets as opposed to detailed mandatory requirements) and not necessarily that they are removed.

In effect, in the event of market failures there are two ways to overcome the problem of market power: to regulate the market or to introduce more competition in the market (Armstrong et al., 1994). The introduction of competition may not be desirable if the industry presents important natural monopoly characteristics, or if there is the threat of "cream-skimming". In these cases regulation tends to persist. There are only two network industries where competition appears attractive, namely telecommunications and post. In these cases, notably in the telecommunications sector, unbundling and technological innovations enabled the introduction of competition in the whole - or part - of the value chain.

In many network industries competition is limited, at least in a first stage. That is why government regulation is nonetheless deemed necessary as a means to ensure that the pursuit of profits does not conflict with social welfare (e.g., Vickers and Yarrow, 1991, Train, 1997). Newbery (2002) goes a step further, suggesting that regulation should not be confined to the natural monopoly elements. The author advocates that the potentially competitive elements also need regulatory oversight so as to ensure that markets are not manipulated nor market power abused. According to these authors, deregulated industries will still need to be regulated (a process also called re-regulation). Let us now go through the main bodies of literature influencing these "deregulation" and "re-regulation" trends, which have been characterising the regulatory processes in network industries. Even in situations where it is difficult to introduce competition (e.g., due to market failures), they explore alternative mechanisms to overcome this limitation, and influence regulation.

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[2] Although this is a relatively consensual principle in economics, some authors UNGERN-STERNBERG, T. V. (2004) *Efficient Monopolies: the Limits of Competition in the European Property Market,* Oxford, Oxford University Press.argue that the unsatisfactory results of some privatisation and liberalisation projects sustain the hypothesis that state monopolies might outperform competitive markets, even in markets that do not exhibit economies of scale.

3.1 Liberalisation: a different paradigm influencing the NI regulation

The theories of regulation presented in chapter 2.1 referred to interventions in order to avoid the abuse of monopoly positions. In a context of deregulation, the regulatory debate focuses on the balance between regulatory intervention and competition policy. First, Contestable Markets Theory campaigns for the advantages of competition. Then, the Bergman's model on the intensity of regulation analyses the conflicting priorities faced during the transition from monopoly to competition. Finally, institutional theories focus on the importance of transaction costs in defining alternative regulatory approaches, and analyse the influence of the institutional environment on the output of regulation.

3.1.1 Theory of Contestable Markets

According to the Theory of Contestable Markets, the threat of competition (or potential competition) on its own induces a monopoly to be efficient (Baumol, 1982, Baumol et al., 1982, Baumol and Willig, 1986). Therefore, there is no need to intervene in the market (i.e., to regulate). When there are no sunk costs, there is the possibility for free entry and free exit (hit-and-run competition), and the markets are considered to be contestable. In this case a competitor can profitably enter the industry, undercut the incumbent, and take away its business. The best way for the incumbent to respond to that threat is to eliminate such profit opportunities by being productively efficient and pricing at average cost (given uniform pricing). Given the constraint that profits cannot go negative, this outcome is welfare optimal, i.e. allocative efficiency is maximized subject to the break-even constraint without any duplication of fixed costs (Armstrong et al., 1994).

One of the major critics made to this theory is that entry can happen faster than the incumbent's price response. Another important critic, especially in the context of the network industries, is that by slightly relaxing the hypothesis of no sunk costs, the predictions of the theory change substantially. One interesting result is that rather than being an argument for the elimination of regulation, the Contestability Theory can be used as a guide for regulation (Baumol and Willig, 1986). In effect, regulation should simulate contestability by setting the regulated prices between incremental and stand alone costs in markets that are not contestable.

Franchise bidding

One way to make a natural monopoly contestable is to assign a franchise through a competitive tender. Demsetz (1968) proposes a return to concession contracts, which had been common in the nineteenth century, as an alternative form of competition (in opposition to both competition in the market and potential competition). The idea is to auction the right to operate the natural monopoly to the firm offering the lowest price of supply. The author criticises the performance of U.S. regulatory agencies and argues that competition for the right to serve the market can substitute for competition within a market. Franchise bidding is regarded as being beneficial for efficiency. The fact that the concession is competitively awarded ensures that prices and services standards are fair to both consumers and investors. Even though franchise bidding has still strong advocates, it presents some drawbacks especially under asset specificity and cost uncertainty[3].

[3] New Institutional Economists analyse in detail franchise bidding contracts. Some results are presented in section 3.1.3.

The theory presented in the following section analyses the transition from monopoly to competition and the consequences in terms of regulatory intensity.

3.1.2 Intensity of Regulation (Bergman's model)

Bergman et al. (1998) focuses on how to make competition a reality in sectors where there is a monopoly or a strongly dominant operator. Accordingly to their model, the intensity of regulation varies as a result of the resolution of conflicting priorities[4] faced in the regulatory process during the transition from monopoly to competition.

The authors distinguish three phases. In the first phase, monopoly prevails and regulation is exerted through ownership in the majority of the cases. There is concern with all the aspects of the industry's activities like prices, investments, allocation of output, social obligations, etc. In phase two one assists to a gradual introduction of competition (monopoly and competition coexist). The focus of regulation is on monopoly abuse by dominant incumbents, emerging competition issues and public services obligations. Finally, in phase three, competition is extensive and increasingly effective in some or all markets. The need for regulation decreases in this phase but it is not completely abolished. The maintenance of public service objectives and fair trading practices still demands some light-handed regulation. The authors also analyse the trade-off in terms of regulation intensity. If regulation is excessively light-handed, then the introduction of effective competition may be delayed due to legal uncertainty. If regulation is excessively heavy-handed and there are few sunset clauses, then it is more likely that institutions become entrenched and the progress towards a more effective regulation is delayed.

The following section focuses on transaction costs and institutional environments as possible explanations for alternative regulatory approaches and respective outcomes.

3.1.3 Institutional Theories

There are two different approaches to regulation within Institutional Theories. The first one, influenced by New Institutionalism, focuses on how regulatory strategies are affected and constrained by the institutional environment, including legal and non-legal rules, which shape, mediate and channel preferences and actions (e.g., Shirley et al., 2000, Spiller and Tommasi, 2005). Regulation is affected by the institutional environment rather than by an overriding public interest or the outcome of competitive bargaining between diverging private interests (Black, 1996).

Institutions are defined as the formal and informal rules that govern the ways in which individuals and organisations interact with each other. Thus, institutions include not only national laws and the political system, but also customs and social conventions. All this constitutes the institutional context in which the regulatory regime is embodied. Major topics of institutional research pertain to the division of powers in the political system and its consequences on opportunistic behaviour from

[4] The authors identify ten conflicting priorities: short vs. long-term objectives; efficiency vs. equity objectives; competition vs. monopoly; slow vs. fast liberalisation; public vs. private ownership; sector specific regulation vs. application of general competition rules; rules vs. discretion; permanent vs. temporary regulation; centralised vs. decentralised regulation; and light-handed vs. heavy-handed regulation.

different actors; the characteristics of the legal systems and their consequences on contracts (e.g., enforcement) and property rights (Gómez-Ibáñez, 2003).

The second approach, influenced by New Institutional Economics (NIE), focuses on transaction costs. Regulation is justified if other rules are more costly in terms of transaction costs. NIE abandons the full-informational rational economic behaviour in favour of bounded-rationality. Coase (1937) is amongst the first authors to question the ability of public authorities (and regulatory agencies for that matter) to have complete and costless access to information, and showed that public regulation is not better in principle than private negotiation for dealing with market failures (Glachant, 2002).

There is a special emphasis on contracts and on franchise contracts[5] in particular. These works produced important results in terms of regulation. Firstly, new institutional economists argue that complexity of the service, agents' cognitive limits, and incomplete information, make it impossible to negotiate a complete contract (Williamson, 1985).

Secondly, they argue that factors such as multidimensional quality, asset specificity and opportunistic behaviour (e.g., *ex post* appropriation threat) fade out the results of *ex ante* competitive mechanisms (e.g., Goldberg, 1976, Williamson, 1976, and Williamson, 1985). Indeed, investment specificity, average cost uncertainty, and high costs associated with repeating the auctions, might well undermine the incentives to invest into the network infrastructure.

Finally, it is difficult to make tenders truly competitive, to define the optimal period of the franchise, and to renegotiate tariffs. For these reasons, some authors (e.g., Williamson, 1985, Armstrong et al., 1994) do argue that even in the event of competitive bidding for the market, *ex-post* (i.e., after signing the contract) intervention in the industry is still necessary. According to Williamson's model, *ex-post* intervention depends on asset specificity[6]. Williamson (1985, , 1996) distinguishes two types of network industry reform: (1) industries with low asset specificity where the threat of competition remains credible *ex-post*; and (2) industries with high asset specificity and little *ex-post* credibility of contractual incentives, and therefore where *ex-post* regulation is needed. Thus, institutional arrangements in network industries need to be adapted to different asset specificities, and cannot be reduced to public intervention. As a matter of fact, no uniform solution, involving either pure competition or public oversight, will find universal application to all network industries (Glachant, 2002).

The following section focuses on instruments for access regulation, which become particularly important monopolistic infrastructures are liberalised.

3.2 Focus on instruments for access regulation

There are three different routes to establishing the conditions of market rules and competition (i.e., to liberalise): competition in the market (operators compete for end users); competition for the market

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5 Please refer to the Franchise Bidding section.

6 Asset specificity refers to the relative lack of transferability of assets intended for use in a given transaction to other uses. Highly specific assets represent sunk costs that have relatively little value beyond their use in the context of a specific transaction.

(operators compete for obtaining exclusive rights to operate in specific segment(s)); and comparative competition. Competition in the market encompasses full market opening, third-party access or a combination of both. Technical unbundling, i.e. the separation of the network into its reserved and competitive elements, is a pre-condition to third party access. Different firms can operate each of these parts of the utility. Also, when it is only possible to introduce competition for the market, the definition and allocation of exclusive rights also become a key issue. Regulating the access to the network is a fundamental form of regulation in a liberalisation context. The remaining of the chapter focuses on the two types of access regulation pertaining to competition *in* and *for* the market, namely (1) the use of the infrastructure through third-party access, and (2) the allocation of rights of supply through franchising.

3.2.1 Third-party access

The "classic" third party access problem in the network industries involves requiring the owner of a monopoly infrastructure to allow a third party to provide a service using the infrastructure[7]. One of the main issues related to third-party access pertains to *access pricing.* The price should, on the one hand, offer the access provider an adequate return to capital in order to encourage investment in the infrastructure and, on the other, encourage its efficient use by third parties.

The principles governing access pricing are an application of natural monopoly pricing theories. In the event of scale or other economies, marginal cost pricing does not allow the firm to cover its total costs. If other sources of revenue are unavailable (e.g., tax revenues), then prices must be raised above marginal costs. In some cases, it is efficient to discriminate prices, charging for example a two-part tariff. An important variant of two-part pricing is capacity based pricing, where the fixed component determines the capacity, and the variable component depends on the purchased quantity (being very high for quantity purchases above that capacity limit) (OECD, 2004).

One of the main challenges for the regulator pertains to the substantial requirements of information (e.g., on the cost structure of the regulated firms), as well as problems of asymmetry of information. The use of price-caps (i.e., the regulated firm sets prices subject to an overall constraint defined by the regulator) is presented by some authors as a solution to these problems.

Finally, it is important to mention the widely discussed efficient component pricing rule (ECPR), which was popularised by Baumol and Sidak (1994). ECPR states that the appropriate access price equals the monopolist's opportunity cost of providing the access, ensuring that production or service provision is not diverted to an inefficient firm[8].

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[7] Other types of access problems refer to cases where competing firms purchase essential inputs (e.g., the use of the infrastructure) from a monopolist and, in addition, the monopoly firm must purchase inputs from the competing firms. In this review we only consider the classic problem of one way access.

[8] For a critical view on ECPR see, for example, ECONOMIDES, N. & WHITE, L. (1995) Access and Interconnection Pricing: How Efficient is the "Efficient Component Pricing Rule"? *Antitrust Bulletin*, XL**,** 557-579.

3.2.2 Franchising

In terms of franchising, it is important to define the way firms are selected and the conditions under which they are to operate. There are different reasons for allocating the right of supply to a firm, such as the existence of a natural monopoly, potential for cream-skimming, and technological or resource scarcity. The franchisee normally becomes a monopolist in a specific market for the duration of the franchise.

The franchise may be directly awarded by the public authority or it may be allocated through competitive bidding (based on public interest or pricing criteria). The degree of competition of the allocation process is an important variable to take into account. The fairness and transparency of the competitive process is essential in determining its consequences on allocative and productive efficiency.

So far the discussion has been centred on the rationale for regulating and the main instruments available to regulators, or, on the contrary, for non-state intervention in the markets. Overall – and even though the debate has not yet come to a final conclusion – it is nevertheless obvious that both privatisation and liberalisation have, somewhat paradoxically, led to a greater/or to a new role for regulation in the network industries. The following chapter focused on how the forms of economic regulation of the network industries tend to converge at incentive regulation.

4. INCENTIVE REGULATION AS THE CONVERGENT FORM OF REGULATION

The traditional forms of regulation have been under criticisms for the past decades, consequently triggering deregulatory trends. However, at least in the network industries, there hasn't been total deregulation but instead a move towards different forms of public intervention, the majority of them focusing on creating more incentives.

At first, in the context of privatisation, the rate of return regulation, which aimed at regulating the private incumbent, was criticised due to the little attention paid to incentives. As a consequence, regulators now tend to implement incentive mechanisms, such as price-caps, for regulating private monopolies (e.g., privatisation of the network industries in England). In the context of liberalisation, competition is introduced in monopolist industries because they lacked incentives for efficiency and performance. Therefore, independently from the type of reform implemented, incentive regulation appears to be the convergent form of regulation in the network industries.

Incentives aim at motivating different actors of the system, especially operators, to reach the objectives set by public authorities, with a reduction of information and administrative costs for both operators and authority/agency (Ogus, 2004).

The application of incentive regulatory mechanisms in network industries may actually refer to different *goals*, which may even be contradictory. Amid the most important ones are to:

- increase economic efficiency (i.e., minimise the costs);
- increase (environmental and service) quality in a cost effective way;
- stimulate (product/service and technical) innovation; and
- stimulate efficient capacity investment.

The most important incentive regulation *instruments* available to the regulator are price mechanisms. In terms of pricing, rate of return (or cost of service) and price cap-regulation are two polar examples of regulatory instruments regarding incentives creation. The former one is considered to be a low-powered incentive mechanism (the regulated firm is compensated of all of the incurred costs of production), while the later one is considered as a high-powered incentive mechanism (prices are adjusted according to an exogenous price and the regulated firm's performance). When regulated firms are given the choice between these two type of contracts, low-cost firms prefer price-cap pricing (because they are left with some rent), while high-cost firms have a preference for cost of service pricing (Laffont and Tirole, 1993). Sliding scale and relative price regulation are intermediate cases in terms of incentive creation, which can be considered optimal in a second best sense (Joskow, 2005).

Incentive regulation mechanisms thus relate to the regulated firm's performance, which is mainly defined by cost and quality variables. Again, the regulator's dependence on information about the regulated firm's costs creates information problems to the regulator. There are some forms proposed in the literature to reduce the regulator's information disadvantage vis-à-vis the regulated firm. One is by offering the regulated firm a menu of cost contingent contracts, forcing them to reveal their cost type (Laffont and Tirole, 1993). Another way is to set the price for each firm based on the costs of identical (non-competing) firms, i.e. by yardstick regulation. Related to yardstick regulation it is benchmarking based on a hypothetical efficient firm (Vogelsang, 2002) (e.g, water and electricity regulation in Chile). Finally, the regulator can also accept the firm's level of costs and focus on benchmarks for performance improvements based on the firm's historical performance (Joskow, 2005).

At last, it is important to make reference to the important trade-off between (operating and capital) costs and (short and long run) quality of the service. Any incentive regulation mechanism needs to consider the potential impact of cost reduction on quality and vice versa. This might imply the need to implement a package of cost-related and quality-related incentives, which constitutes a huge challenge for regulators.

5. CONCLUSIONS

The purpose of this paper is to present a synthesis of the main theories about regulation and instruments in network industries, by tracing a parallel with the industries reform processes. One can identify two different processes: (1) privatisation and public intervention aimed at ensuring there is no abuse of monopoly position; and (2) pressure to liberalise (deregulate) and reliance on competition policy. The literature on the regulation of the network industries has followed, and sometimes triggered, the reform processes described above. Public Interest Theories were the first ones to suggest that government intervention (by rational and expert analysis) is justified by the pursuit of public

interest. Private Interest or Capture theories followed next by criticising the altruistic way Public Interest Theories justified regulation, and by, at least indirectly, validating the deregulation movement.

Contestable Markets and franchise bidding theories brought a different light into the discussion by proposing alternative mechanisms to complete deregulation (when the characteristics of the industry do not permit the introduction of competition in the market). On a slightly different register, the Bergman's model focuses on how to make competition a reality in sectors characterised by monopolies, and on its consequences in terms of regulatory intensity. Institutional theories followed the same path by defending that public regulation is not better in principle than other types of institutional mechanisms for dealing with market failures.

In practice today, in many (segments of) network industries deregulation regarded essentially the command-and-control type of regulation, and not other types of intervention in the market. As a matter of fact, there has been a move towards different forms of intervention, with a special emphasis on incentive regulation. There is actually a trend towards incentive regulation in recognition of the need to ensuring that the pursuit of profit does not conflict with social welfare (re-regulation). Moreover, price mechanisms (both for access and service) become the most important regulatory instruments available to the regulator.

At the same time, we are witnessing the rise in importance of regulatory agencies as a significant actor in the regulatory system. By relying on regulatory agencies, the question that comes to mind is whether we are coming back to Public Interest Theories and to the belief that a well intended agency can pursuit the public interest. Our perception of the reality in the majority of the network industries is that there are considerable differences today relatively to the initial propositions of Public Interest Theories. Probably the most important difference pertains to the regulatory objectives and the move away from the dichotomy between pursuing the public and the private interests. Today, the chief challenge of regulation is to properly balance the interests and powers of both consumers and investors. Another important difference is related to the independence of these agencies both vis-à-vis political interferences and the industry. Finally, the most recent theories on regulation emphasise transparency and public participation as fundamental pillars of the regulatory system. The regulatory objectives and the activity of regulatory agencies are therefore influenced by these governance mechanisms.

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